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are recorded in *Lupinus* (*L. Brittoni*), *Amorpha* (*A. occidentalis*), *Ceanothus* (*C. austro-montanus*), and *Malacothamnus* (*M. Nuttallii*); and several new combinations are made. The work includes 375 recognized species, representing approximately 150 genera, distributed in 57 families. Whether or not we agree with the limitation of groups and the nomenclature in all cases is a matter of minor significance. It is a pleasure to state that the author has given us a work which will serve as an exceedingly helpful guide in studying the woody plants of southern California.—J. M. GREENMAN.

North American Flora.[4]—Volume III, part 1, contains a treatment of the Nectriaceae and Hypocreaceae by F. J. SEAVER, the Chaetomiaceae by H. L. PALLISER, and the Fimetariaceae by D. GRIFFITHS and F. J. SEAVER. These four families are represented by 242 species which are referred to 45 genera. One new species is described in *Scoleonectria* (*S. tetraspora*), found growing on trunks of cacao in Jamaica, and four new species from eastern and central United States are added to *Chaetomium*.—J. M. GREENMAN.

Revision of Eucalyptus.—The recent issue of Volume II, part 2, continues MR. MAIDEN'S[5] excellent revision of this genus. The present part contains descriptive matter relating to ten species and four full-page illustrations. This work can be used advantageously in conjunction with the "Forest flora of New South Wales" by the same author.—J. M. GREENMAN.

NOTES FOR STUDENTS

Cystidia of Coprinus.—BULLER[6] has given an interesting account of his studies on the cystidia of *Coprinus atramentarius*. The lamellae of this species are very thin, broad, with parallel sides, and lie very close together. Because of their soft texture and extreme flexibility, many of them would lie very close together, or actually adhere, were it not for some kind of stay or prop for spacing them. The spores, then, which are shot off from the sterigmata could not fall down and out from the interlamellar spaces. The cystidia function as props to hold the lamellae equidistant. They are large cylindrical cells, with a slender stalk, which grow out from the subhymenium, the broad portion extending across the interlamellar space against the opposite gill surface or sometimes slightly entering it. They are 120–170×20–30 μ, quite evenly distributed, there being about 75–100 on each square mm. of gill surface.

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[4] North American flora, Vol. III, part 1, pp. 1–88. New York Botanical Garden. December 29, 1910.

[5] MAIDEN, J. H., A critical revision of the genus *Eucalyptus*, Vol. II, part 2, pp. 61–100, *pls. 53–56*. Sydney: William Applegate Gullick. 1910.

[6] BULLER, A. H. R., The function and fate of the cystidia of *Coprinus atramentarius*, together with some general remarks on *Coprinus* fruit bodies. Annals of Botany **24**:613–629. *pls. 50, 51*. 1910.

The large number of cystidia thus crossing the interlamellar spaces would themselves be a great hindrance to the escape of the spores in their fall were it not for the fact that they disappear from the area of spore discharge just prior to the maturity and discharge of the spores. The author has shown in a previous publication[7] that in a large number of Hymenomycetes studied the spores are shot from the sterigmata to near the middle of the interlamellar space, and then fall slowly downward and out where they are caught by air currents. He also has shown that in large Coprini like *C. comatus*, where the gills are broad and lie very near each other, the maturity and discharge of the spores begins over a limited area at the lower end and edge of the gills and proceeds upward, and that this is followed by the deliquescence of the lamellae in the same succession, thus leaving a broader space for the fall of the spores. He believes this deliquescence is brought about by enzymes formed in the cells, and so applies the term "auto-digestion."

He now shows that in *C. atramentarius* the same progress of spore development, discharge, and autodigestion of the lamellae takes place, and further, that the cystidia disappear in advance of spore discharge by a similar autodigestion, the fluid content of the large cystidium perhaps being absorbed by the subhymenium, while the wall is digested. In *C. comatus* he says there are no cystidia on the sides of the gills, but the edges are provided with numerous larger, elongated cells which are crowded and many of which extend laterally, thus meeting those of adjacent gills. This broad gill margin, which is absent in *C. atramentarius*, thus serves to prop the gills apart.

In his general remarks on *Coprinus* fruit bodies, he points out that the type of gill in *Coprinus*, very thin and with parallel sides, is not so well adapted to spore escape as the thicker and more or less V-shaped gill of the mushroom (*Agaricus campestris*) type, since the overhang permits the spores to escape readily, and thus they are maturing simultaneously over the entire hymenial surface. The lamellae of the Coprini which lack this overhang mature their spores from below upward. Autodigestion removes the older portions after spore discharge and the cystidia before spore discharge, the whole series of events showing a remarkable adaptation.

He has now determined that even in the plicate Coprini there is slight autodigestion of the lower edge of the gills. The splitting of the gill from above downward probably gives an overhang here, and thus the form of the gill is ultimately more of the V-shape.

He has found cystidia as props in *C. atramentarius*, *C. narcoticus*, *C. stercorarius*, *C. fimetarius*, and *C. niveus;* while the following lack cystidia on the sides of gills but have the tumid margin: *C. comatus*, *C. sterquilinus*, and *C. plicatiloides*. Autodigestion has been observed in eight species of *Coprinus*.

In his general remarks on cystidia he states that they are unbranched. However, one genus of Thelephoraceae (*Asterostroma*) and one of Hydnaceae

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[7] BULLER, A. H. R., Researches on Fungi. pp. 287. 1909.

(*Asterodon*) are so named because of the presence of stellately branched cystidia. In *Mycena lasiosperma* Bres.,[8] the ends of the cystidia are several times branched. The ends of the cystidia in several species of *Pluteus*[9] are branched into a group of verticillate prongs. Their presence, absence, or variability in certain genera is as often accounted for by the action of the systematist as by any natural relationship of the forms.—GEO. F. ATKINSON.

Salt marsh development.—The theories advanced for the origin and development of salt marshes, with their typical plant associations, have postulated a shore being built up in bays, estuaries, and barrier-protected lagoons by organic matter resulting from the marsh vegetation and its entangled silt, resulting in a progressive plant succession. Recently DAVIS[10] studied numerous sections of salt marshes in the vicinity of Boston, and found that the deposits were largely composed of the remains of salt marsh plants growing only within a vertical range of about three feet from high tide; and still more remarkable, thick beds of peat formed almost entirely from turf built by *Spartina patens*, a salt marsh grass with even more restricted vertical range. In other instances fresh water deposits were found below the salt marsh peat. Similar but much more limited data previously presented by PENHALLOW, as a result of investigations on the Maine coast, in an article reviewed in this journal,[11] caused him to assign to the phenomena the same explanation as that now given by DAVIS, namely, that the coast has for centuries been gradually subsiding. Peat deposits sixteen feet in thickness indicate this as the minimum amount of subsidence in the Boston area. This region, therefore, would present an interesting example of a static plant formation as a response to an actively dynamic topography, the rate of upbuilding by the vegetation being the same as that of the coastal subsidence. That subsidence was not constantly maintained throughout the entire period of time required for the formation of the deposits under investigation is shown by the presence of at least one bed of fresh water peat including tree stumps between two layers of *Spartina patens* turf.

Further evidence of a similar character is furnished by BARTLETT[12] from a study of a marsh at Woods Hole (Mass.), where similar peat deposits were found with large stumps of *Chamaecyparis thyoides* upon the beach where they were submerged at high tide and yet under conditions where there could have been no lowering due to undermining. Sections of this marsh also showed fresh water deposits sixteen feet below the present high tide level. Such data

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[8] Fung. Trid. **1**:33. *pl. 37. fig. 1.* 1883.

[9] For example, see *Pluteus cervinus* in PATOUILLARD, N., Tab. Analyt. Fung. **1**:152. *pl. 335.* 1885.

[10] DAVIS, CHARLES A., Salt marsh formation near Boston and its geological significance. Economic Geology **5**:623–639. 1910.

[11] BOT. GAZETTE **45**:352. 1908.

[12] BARTLETT, HARLEY H., The submarine *Chamaecyparis* bog at Woods Hole, Mass. Rhodora **11**:221–235. 1909.